

REMARKS

Claims 42 and 43 have been amended without prejudice. Claims 44 and 45 are new.
Examination of the claims, as amended, is respectfully requested.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

1 1. (As filed) A method of depositing a cladding layer over external services of a
2 waveguide structure formed on a planar substrate, the waveguide structure comprising a planar
3 waveguide core formed on the planar substrate and a raised structure formed on the planar substrate
4 adjacent the waveguide core, the method comprising the steps of:

5 depositing a cladding material over a planar waveguide structure,
6 etching the deposited cladding material so as to reduce shadowing effects between the
7 waveguide core and the raised structure during the deposition of the cladding material, and
8 controlling at least one parameter of the deposition so as to form a cladding layer
9 from the deposited material.

2 2. (As filed) A method as claimed in claim 1, wherein the cladding material is
deposited and etched such that the resultant cladding layer is substantially free of macroscopic and
microscopic voids.

3 3. (As filed) A method as claimed in claim 1, wherein the raised structure
comprise one in a group comprising a further planar waveguide core, a slab waveguide, a contact
structure, a support structure, a processor structure, and an alignment structure.

4 4. (As filed) A method as claimed in claim 1, wherein the step of etching
comprises preferentially etching the deposited material at or near corners of the waveguide structure.

5 5. (As filed) A method as claimed in claim 1, wherein the step of etching is
6 conducted in a manner which reduces shadowing effects resulting from an accumulation of cladding
7 material at or near respective opposed corners of the waveguide core and raised structure.

8 6. (As filed) A method as claimed in claim 5, wherein the step of etching is
9 conducted in a manner which reduces shadowing effects by removing overhanging structures
extending from the corners of the waveguide core and raised structure, the overhanging structures
resulting from a build-up of cladding material.

1 7. (As filed) A method as claimed in claim 1, further comprising increasing a
2 rate of the etching with increasing height of the waveguide core and/or the raised structure.

1 8. (As filed) A method as claimed in claim 1, wherein the step of etching
2 comprises ion bombarding the deposited cladding material so as to cause sputtering.

1 9. (As filed) A method as claimed in claim 8, wherein the ions involved in the
2 ion bombardment comprise argon (Ar) ions.

1 10. (As filed) A method as claimed in claim 9, wherein the AR ions are directed
2 at an angle of substantially 90° to the substrate.

1 11. (As filed) A method as claimed in claim 1, wherein the step of etching and
2 the step of depositing the cladding material are conducted simultaneously.

1 12. (As filed) A method as claimed in claim 1, wherein the step of etching and
2 the step of depositing the cladding material are conducted sequentially.

1 13. (As filed) A method as claimed in claim 1, wherein the step of etching is
2 conducted in a manner which controls the energy of any cladding material which is etched away but
3 subsequently re-deposited in the region between the waveguide core and the raised structure,
4 whereby a material property of the material deposited in the region between the waveguide core and
5 the raised structure is controlled.

1 14. (As filed) A method as claimed in claim 1, wherein the step of depositing the
2 cladding material comprises PECVD.

1 15. (As filed) A method as claimed in claim 14, wherein the PECVD is
2 conducted in the absence of nitrogen or nitrogen-containing gases, whereby optical absorption in the
3 resulting cladding layer is reduced.

1 16. (As filed) A method as claimed in claim 14, wherein the PECVD process is
2 conducted such that the etching results from ion bombardment arising from the PECVD process.

1 17. (As filed) A method as claimed in claim 14, wherein the PECVD process is
2 conducted such that the etching results from ion bombardment arising from the PECVD process, and
3 wherein the ion bombardment is controlled by controlling of or more deposition parameters in a
4 group comprising: power input into the PECVD; frequency of a radio frequency (RF) power supply

5 for the PECVD; power of one power supply in a dual-frequency power supply for the PECVD;
6 substrate temperature; and argon-to-precursor vapor flow ration during the PECVD.

1 18. (As filed) A method as claimed in claim 14, wherein the PECVD process
2 comprises utilizing a liquid source for the precursor vapor.

1 19. (As filed) A method as claimed in claim 1, wherein the step of depositing
2 cladding material comprises depositing a gap-fill layer of the cladding material to substantially fill a
3 gap between the waveguide core and the raised structure, and depositing an overlayer of cladding
4 material over the gap-fill layer, the overlayer being deposited at a higher deposition rate than the
5 gap-fill layer.

1 20. (As filed) A method as claimed in claim 19, wherein the method further
2 comprises a step of annealing the deposited cladding material to equalize the densities of cladding
3 material deposited between the waveguide core and the raised structure and above the waveguide
4 core.

1 21. (As filed) A method as claimed in claim 1, wherein the method further
2 comprises a step of doping the cladding layer with a refractive-index-modifying dopant during or
3 after the deposition of the cladding material.

1 22. (As filed) A method as claimed in claim 1, wherein the step of depositing
2 cladding material comprises depositing a plurality of layers of cladding material, wherein at least
3 one of the layers exhibits a compressive stress and the remaining layer(s) exhibits a tensile stress
4 which at least partially compensates for the compressive stress.

1 23. (As filed) A method as claimed in claim 22, wherein the cladding layer has
2 substantially zero net stress.

1 24. (As filed) A method as claimed in claim 11, wherein the cladding layer is
2 formed with a predetermined stress by controlling the etching component during the deposition of
3 the cladding material.

1 25. (As filed) A method as claimed in claim 1, wherein the etching is conducted
2 in a manner which prevents etching of the waveguide structure.

1 26. (As filed) A method as claimed in claim 1, wherein the step of etching
2 comprises etching portions of the waveguide structure at or near respective opposed corners of the
3 waveguide core and raised starter.

1 27. (As filed) A method as claimed in claim 1, wherein the steps of depositing
2 and etching the cladding materials are conducted in respective dedicated processing chambers.

1 28. (As filed) A method as claimed in claim 1, wherein the substrate comprises
2 an optical buffer layer formed on an underlying substrate wafer, for optically isolating the
3 waveguide core from the substrate wafer.

1 29. (As filed) A method as claimed in claim 1, wherein an aspect ratio of a region
2 between the waveguide core and the raised structure is at least 0.5:1.

3 30. (As filed) A method as claimed in claim 29, wherein the aspect ratio is at
4 least 0.8:1.

5 31. (As filed) A method of depositing a cladding layer over a waveguide
6 structure formed on a planar substrate, the waveguide structure comprising a planar waveguide core
7 formed on a planar substrate and a raised structure formed on the planar substrate adjacent the
8 waveguide core, the method comprising the steps of:

9 modifying cross-sectional shapes of the waveguide core and the raised structure;
10 depositing a cladding material over external surfaces of the modified waveguide core
11 and raised structure, and

12 controlling at least one parameter of the deposition so as to form a cladding layer
from the deposited cladding material,

 wherein the cross-sectional shapes are modified such that there is a reduction in
shadowing effects between the waveguide core and the raised structure during the deposition of the
cladding material.

1 32. (As filed) A method as claimed in claim 31, wherein the raised structure
2 comprises one in a group comprising a further planar waveguide core, a slab waveguide, a contact
3 structure, a support structure, a processor structure, and an alignment structure.

1 33. (As filed) A method as claimed in claim 31, wherein the waveguide core and
2 the raised structure are modified such that the resultant cladding layer is substantially free of
3 macroscopic and microscopic voids.

1 34. (As filed) A method as claimed in claim 31, wherein the waveguide core and
2 the raised structure are modified such that at least portions of sidewalls of the modified waveguide
3 core and the raised structure are sloped with respect to the substrate.

1 35. (As filed) A method as claimed in claim 31, wherein the modified waveguide
2 core has a generally-triangular cross-sectional shape.

1 36. (As filed) A method as claimed in claim 31, wherein the step of modifying
2 the cross-sectional shapes comprises preferentially etching the waveguide core and the raised
3 structure at or near respective opposed corners of the waveguide core and the raised structure.

1 37. (As filed) A method as claimed in claim 36, wherein the preferential etching
2 is a results of ion bombardment.

1 38. (As filed) A method as claimed in claim 36, wherein the preferential etching
2 is a result of ion bombardment, and wherein the ions involved in the ion bombardment are directed
3 at a angle of substantially 90° to the substrate.

1 39. (As filed) A method as claimed in claim 31, wherein the substrate comprises
2 an optical buffer layer formed on an underlying substrate wafer for optically isolating the waveguide
3 core from the substrate wafer.

1 40. (As filed) A method as claimed in claim 31, wherein an aspect ratio of a
2 region between the original waveguide core and raised structure is at least 0.5:1.

1 41. (As filed) A method as claimed in claim 31, wherein an aspect ratio of a
2 region between the original waveguide core and raised structure is at least 0.8:1.

1 42. (Amended) An optical component fabricated utilizing a method as claimed in
2 **[either] claim 1[or claim 31].**

1 43. (Amended) An optical component assembly incorporating a component
2 fabricated utilizing a method as claimed in **[either]** claim 1 **[or claim 31]**.

1 44. (New) An optical component fabricated utilizing a method as claimed in
2 claim 31.

1 45. (New) An optical component assembly incorporating a component fabricated
2 utilizing a method as claimed in claim 31.

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